CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME III

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Md. Zahangir Alam
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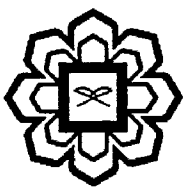
Department of Biotechnology Engineering
Faculty of Engineering
International Islamic University Malaysia



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CHAPTER 30

PROCESS OPTIMIZATION OF HYDROCOLLOID PRODUCTION FROM SEAWEEDS

Irwandi Jaswir, Mohd Razi Kodin and Parveen Jamal

Department of Biotechnology Engineering, Faculty of Engineering,
International Islamic University Malaysia, P.O. Box 10, 50728 Kuala Lumpur, Malaysia

ABSTRACT

This study was undertaken to find the optimum conditions for the extraction of hydrocolloids from seaweed of species *Gracilaria* changii. Recent trend of seaweed industry in producing hydrocolloids component shows a decline because of the high cost of production. Hence, an optimum parameter is now crucial to maximize the yield and the quality, at the same time minimize loss. Furthermore, the concern about the *halal* food among Muslim give advantage to hydrocolloids that have similar properties to gelatin, make it a suitable substitutes in food industry. Hydrocolloids from seaweed consist of three components, which are agar, carrageenan and alginates. The initial screening test shows that agar is the most abundance hydrocolloids with 13.70 mg/g yield. The optimal conditions for maximum yield were found at 5% NaOH concentration with 0.5 hours treatment time and 3 hours extraction time. Maximum gel strength was obtained for seaweed treated with 8% NaOH solution with 0.5 hours treatment time and 1 hour extraction time with 313.6 gcm^{-2} gel strength.

Keywords: *Gracilaria changii,* hydrocolloids, seaweeds, gelatin replacers

INTRODUCTION

The main benefit of seaweed is for food. Of all seaweed products, hydrocolloids have had the biggest influence on modern western societies (Kumar & Fotedar, 2009). The principle commercial seaweeds extract are the three hydrocolloids, agar, alginates, and carrageenans Seaweeds as a source of these hydrocolloids dates back to 1658, when the gelling properties of agar, extracted with hot water from a red seaweed, were first discovered in Japan. It was not until the 1930s that extracts of brown seaweeds, containing alginate, were produced commercially and sold as thickening and gelling agents (Bixter and Porse, 2010).

Today, approximately 1 million tonnes of wet seaweed are harvested and extracted to produce the above three hydrocolloids. Total hydrocolloid production is about 55 000 tonnes, with a value of US$ 585 million. Alginate production which gives US$ 213 million in return, is by extraction from brown seaweeds, all of which are harvested from the wild since cultivation of brown seaweeds is too expensive to provide raw material for industrial uses. Agar production, which gives US$ 132 million of return, is principally from two types of red